

EXPOSURE AND RISK ASSESSMENT OF VOLATILE ORGANIC COMPOUNDS AND CARBONYLS IN INDOOR ENVIRONMENTS IN EUROPE

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Background and Aims: The study paper summarizes the existing cancer and non-cancer risks posed by indoor exposure in dwellings and public buildings in European Union (EU) countries, due to the occurrence of major organic compounds (benzene, toluene, xylenes, styrene, acetaldehyde, formaldehyde, naphthalene, limonene, α -pinene and ammonia, classified by the European Commission's INDEX strategy report as the priority pollutants to be regulated).

Methods: The indoor air quality data used in the study were obtained from the literature of the last decade, including the results of large-scale European projects (e.g. EXPOLIS, AIRMEX), as well as the ones from individual investigator groups. Cancer potency factors and exposure limits (for estimating cancer risks and Margin of Safety respectively) were obtained from different regulatory bodies (EPA-IRIS, OEHHA), aiming to identify the differences in pollutants prioritization imposed by the relevant approaches.

Results: The review process indicated that significant differences in indoor air quality exist within and among the countries where data were available, indicating corresponding differences in sources and emission strength of airborne chemicals, identified or not. Conservative exposure limits were not exceeded for non-carcinogenic effects, except for formaldehyde; for carcinogenic agents the estimated risks were up to three orders of magnitude higher than the one (10^{-6}) proposed as acceptable by risk management bodies. Prioritization between formaldehyde and benzene depends more on the cancer potency factors assumed than the levels of existing concentrations.

Conclusions: The risk assessment evaluation process faces crucial difficulties, either due to the relative paucity of indoor air quality measurements in many EU countries, or by the lack of sampling consistency in the already existing studies, indicating the need for additional measurements of indoor air quality following a harmonized sampling protocol. Additionally, uncertainties embodied in the cancer potency factors and exposure limit values impose further difficulties in substance prioritization and risk management.